

Feb. 3, 2005 – TES run, boundary-layer sampling, and sun run

Flight plan:

The plan is to coordinate with ozonesonde launches at Wallops and Rhode Island, fly along the TES nadir track coordinated with the Aura overpass (with TES special operations providing numerous nadir measurements), execute boundary-layer run at 1000 feet for validation of OMI NO₂ measurements, and finally make a long sun run.

The estimated duration is 8.25 hours.

Report:

Takeoff was approximately on time (14:33:29 UT). ICATS was having problems with its archival system and had to reboot early on. As we headed toward Wallops, we had a thick stratus deck below, thin cirrus above the aircraft, and thick cirrus were visible ahead. Thin cirrus were above the aircraft when we passed over the Rhode Island sonde launch, but DIAL still appeared to be retrieving ozone above. We were well above the cirrus at 34 kft.

As we approached Wallops, there was a thick cirrus deck below at about 26 kft. Before we started the TES run, the cloud deck below lowered to about 5 km.

As we started our descent at waypoint 7, we still had patchy clouds below. In our spiral down at waypoint 8, there were few, if any, clouds below. The boundary-layer run was in an entirely clear region. Visibility was poor, with a brownish, visibly polluted boundary layer (see photo below). BNOD reported intermittent NO₂ concentrations of a few ppbv, and we were apparently just into the top of the boundary layer at 1000 feet. SAGA reported HNO₃ and SO₂ concentrations of > 7 ppbv and 8-9 ppbv, respectively. DACOM reported 100 ppbv shifts in CO and CH₄ concentration, presumably because we were flying along the inversion – sometimes above and sometimes below. Minor course corrections were made to avoid strafing small towns. The chemtrail enthusiasts should be quite excited about a 4-engine NASA jet cruising overhead at 1000 feet.

When we returned to the TES track, we moved over a cloud deck with a top altitude of 3 km. Shortly thereafter, we were over a thick surface fog layer, which should provide a relatively uniform surface for TES retrievals. At the northern end of the TES run, it was completely clear.

Through much of the flight there were interesting structures in the tropopause region (folds, intrusions, etc.) based on *in situ* tracer measurements and DIAL nadir ozone measurements. On the way north, the DIAL nadir data showed a 1- to 2-km thick low ozone layer sloping upward from near the surface to near the tropopause.

FTS collected spectra during the 1-hour southbound sun run.



Figure 1: Image taken during boundary-layer run over Michigan.

Instrument status:

- AROTAL: McGee—good flight
- DIAL: Browell—good flight, lots of ozone structure
- FTS: Coffey—good sun run
- CAFS: Shetter—apparently fine
- MTP: Mahoney—good flight
- ASUR: Notholt—worked well
- nadir CO₂: Heaps—good flight
- FastOz: Avery—good flight, nice airmass transitions
- DACOM: Diskin—good flight, interesting data
- DLH: Diskin—good flight, interesting structure
- SAGA: Dibb—worked well, large range in concentrations
- BNOD: Cohen—good flight, enjoyed pollution
- ICATS: Hang—lost some data
- COBALT: Podolske—good flight, brief computer glitch